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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Paper No. 33

Serial Number: 08/113,561
Filing Date: 08/25/93
Appellant(s): Anderson et al.

David L. Parker

For Appellant

EXAMINER'S ANSWER

This is a response to appellant's brief on appeal filed 10/23/95

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Status of claims.

The statement of the status of claims contained in the brief is correct.

This appeal involves claims 2-4, 47, 50-58 and 60-67 which are the only claims currently pending in this application.

Status of Amendment After Final.

The appellant's statement of the status of amendments after final rejection contained in the brief is correct. The amendment after final rejection presented with Appellants' brief has been entered.

Related Appeals and Interferences.

The appeal filed in related case 07/565,844 is no longer pending as a notice of allowability has been issued in that case.

Summary of Invention

The summary of the invention in the brief is correct.

Issues.

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows:

The provisional rejection of claims 2-4, 47, 50-58 and 60-67 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 28-68 of copending application serial No. 07/508,045 is withdrawn in view of Applicants cancellation of the subject matter common to both applications. Serial No. 07/508,045 has matured into US patent 5,484,956 having claims limited to a fertile transgenic maize expressing *Bt* endotoxin at level sufficient to produce insect resistance in the plant.

Grouping of Claims.

Appellant's brief includes a statement that claims 2-4, 47, 50-58 and 60-67 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(5) and (c)(6).

Claims Appealed.

The copy of the appealed claims contained in the Appendix to the brief is correct.

Prior art of record.

The following is a listing of the prior art relied upon in the rejection of claims under appeal.¹

Patent references:

✓ 5,187,073	Goldman et al.	Feb. 16, 1993
✓ 5,484,956	Lundquist et al.	Jan. 16, 1996

New Prior art.

No new prior art has been applied in this examiner's answer.

Grounds of Rejection.

The following grounds of rejection are applicable to the appealed claims.

Claims 2-4, 47, 50-58 and 60-67 under appeal are rejected under 35 U.S.C. 103 as obvious over Goldman et al. in view of Applicants acknowledged state of the prior art

Goldman et al. (entire patent, especially column 15) teach the obtention of fertile transgenic maize plants in which the genome of said plants have been augmented by the heritable insertion of exogenous DNA from a transformation process. The plants produced enzymatic activity of lysopine including both mobilization and transfer functions. The fertile nature of the plants is evidenced by the

¹ Approximately 300 references have been cited during prosecution and are currently maintained in the examiner's office for use in other files under 37 CFR 1.97.

heritable transfer of non-native enzymatic activity via pollination from the R₀ plant to seedlings of said plant (progeny) which displayed a transgenic augmented maize genome. Goldman et al. do not teach the obtention of maize plants having their genomes augmented by the specific claimed composition of genes and gene elements in the transgenic plants. The person having ordinary skill in the art would view these transgenic insertions in a host to be dependent on the knowledge and availability of each DNA sequence in the art. Each limitation set forth above, in terms of the genes and gene elements of interest, were available in the prior art as was acknowledged by Appellant in the specification. At pages 107-112 and 248-257² of the specification is a recitation of prior art structural genes and elements that control and/or affect the expression of the structural genes³, and in which each is acknowledged as available to the person having ordinary skill in the art prior to the making of the claimed invention. For example, at page 122 is the *E. coli* gene designated *MHD*⁴ which encode mannitol-1-phosphase dehydrogenase. This genetic construct had been previously isolated and expressed in transgenic tobacco plants to induce an agronomically favorable stress and drought tolerant phenotype (Tarczynski et al. in 1993 (also exhibit K)). The *bxn* gene, useful as a herbicide resistance gene in transgenic tobacco (bromoxynil is an inhibitor of photosystem II), is evidenced at page 108, reference 13, of the specification. Screenable and/or selectable markers desirable for the ability to detect transformants are evidenced beginning at page 169 and the use of antisense in negative selection is acknowledged beginning at page 50. In each specific recitation of a gene or gene element the concept to use the same in plant transformation was either demonstrated or suggested. Thus a person having ordinary skill in the art would view the use of such prior art genes and gene elements as the optimization of process parameter and the selection of one elements, in the absence of unexpected results, to be obvious. Accordingly, the modification of Goldman et al. by the use of prior art genes or gene elements was well within the ordinary skill of the art at the time the claimed invention was made. The motivation to substitute the acknowledged prior art genetic material to augment the plant, as herein claimed, is provided by: 1) the desire to obtain the agronomic benefits for which each gene type is known and 2) from the expectation provided by Goldman et al. that the modified plant will, in fact, demonstrate that disclosed agronomic benefit. Thus, the claimed invention as a whole was clearly *prima*

² References cited to teach the gene and gene elements are recited at pages 258-273.

³ Elements include inducible, tissue specific or constitutive promoters, enhancer, transit peptides and terminator sequences which have all been previously shown to function in transgenic plants.

⁴ First isolated by Lee et al. see page 109, reference 26.

facie obvious in view of the references, in the absence of sufficient, clear, and convincing evidence to the contrary.

Claims 2-4, 47, 50-58 and 60-67 under appeal are rejected under 35 U.S.C. § 103 as being obvious over Lundquist et al.

Lundquist et al. '956⁵ discloses fertile transgenic maize in which the genome is augmented by the addition of non-native DNA. The instant application and the issued patent differ in the precise recitation of the DNA of interest. The instant specification acknowledges that all species of DNA employed herein were well known and available in the art. The person having ordinary skill in the art would view the choice of DNA that was previously well known and available in the art as mere experimenter preference in the absence of evidence the same functioned in a means not previously disclosed. Accordingly the person having ordinary skill in the art would view the genetically modified cells and plants herein claimed as clearly *prima facie* obvious in the absence of sufficient, clear, and convincing evidence to the contrary.

New Grounds of Rejection.

This examiner's answer contains the following NEW GROUNDS OF REJECTION.

Claim 50 under appeal is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 50⁶ is dependent from a canceled claims and as such fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

⁵Lundquist et al. is currently owned by the instant assignee but was not so owned at the time the invention was made. No inventors are common to the instant application and no priority has been asserted to this application which has an earlier filing date than the case under appeal. Accordingly Lundquist et al. is available as 35 U.S.C. § 103 prior art under § 102(e).

⁶ For the purpose of this appeal claim 50 has been treated as if it depended from claim 47.

Response to Arguments.

The commanding issue under consideration, in both pending rejections, is framed as: are claims to genetically modified maize plant produced using acknowledged effective techniques by adding genetic materials thereto where the genetic material is acknowledged to confer certain agronomically desirable benefits to plants when inserted into the genome of the plant obvious within the meaning of 35 U.S.C. § 103. Appellants at page 30 of the brief state:

Appellants do not contest in the present appeal the fact that general techniques were known for producing transgenic maize plants prior to the making of the present invention. Since maize transformation techniques were known at the time the present invention was made, the issue of whether the '073 patent is enabling is not ultimately relevant to the patentability of the present invention.

Given Appellants' admission it remains the examiner's position that a *prima facie* case of obviousness exists as each of the claimed transgenic plants comprise previously known and isolated genes or gene elements and that the person having ordinary skill in the art would have both the motivation to insert the same into maize and a reasonable expectation of success that they would function in their **claimed manner**; that is to provide an identifiable phenotype when compared to a non-transformed plant. No evidence is presented of unexpected results nor is any argued by Appellants. Appellants instead urge, throughout the brief, that "... [T]he issue is not whether the prior art genetic elements actually function in corn, the issue is whether the prior art provides a proper motivation and evidence in advance that the invention would be successful." (page 11, final paragraph). At page 12, citing *In re Vaeck*, Appellants remind us that to make out a *prima facie* case of obviousness two things must be shown: that the prior art would suggest the claimed composition and provide a reasonable expectation of success which must be found in the prior art and not in Appellants' disclosure.

An examination of the claimed invention teaches that the claimed transgenic plants comprise genes that fall into broad categories each defined by independent claims and framed by a preamble which states: "A fertile, transgenic maize plant, the genome of which has been augmented by the introduction of a DNA composition comprising ..." which is then followed by a series of Markush groups each listing the different types of gene equivalents or gene elements as follows:

Claim 47 "a selectable or screenable marker gene selected from the group consisting of ..."

Claim 60 "a negatively-selectable marker ..."

Claim 61 “ an exogenous gene encoding a selected trait, the gene positioned under the control of ...”

Claim 62 “ a herbicide resistance trait ...”

Claim 63 “ an insect resistance trait ...”

Claim 64 “ a pathogen related (PR) protein gene ...”

Claim 65 “ a stress resistance trait ...”

Claim 66 “a drought resistance trait ...”

Claim 67 “a grain composition trait ...”

Each of the claimed grouping are directed to known gene species which provide known agronomic effects, such as herbicide resistance, grain composition or drought resistance or to an effect necessary for the efficient transformation of maize, such as a selectable or negatively selectable marker trait. It is the examiner's position that motivation for the insertion of these grouping clearly resides in the prior art. In the instance of Lundquist et al. beginning at column 6 and extending to column 10 the types of DNA useful in the transformation of maize are recited. At column 7 Lundquist et al. states:

Suitable heterologous DNA used herein includes all DNA which provides for, or enhances, a beneficial feature of the resultant transgenic corn plant. The DNA may encode proteins or antisense RNA transcripts in order to promote increased food value, higher yields, pest resistance, disease resistance and the like. For example, the DNA can encode a bacterial *dapA* for increased lysine production; *Bacillus thuringiensis* (BT) t-endotoxin or protease inhibitors for insect resistance; bacterial ESPS synthetase for resistance to glyphosate herbicide; and chitinase or glucan endo-1,3-B glucosidase for fungal properties. Aside from DNA sequences that serve as transcription units or portions thereof, useful DNA may be transcribed, serving a regulatory or structural function. Also the DNA may be introduced as a genetic tool to generate mutants and/or assist in the identification, genetic tagging, or isolation of segments of corn DNA.
...

The heterologous DNA to be introduced into the plant further will contain either a selectable marker or reporter gene or both to facilitate identification and selection of transformed cells. ...

Similarly the disclosure of Goldman et al. provides motivation for the claimed invention. At column 7 they state:

A heterologous gene is a gene which is not normally found in the T-DNA and which is also not normally found in the DNA of the strain of Gramineae⁷ which is to be transformed. Heterologous genes may be isolated from prokaryotic and eukaryotic sources, including strains of Gramineae other than the one to be transformed. **Of particular interest are those heterologous genes which confer agronomically significant traits on plants containing them.** [Emphasis added.]

The heterologous gene is flanked by a transcription unit containing, e.g., promoters and terminators, which allow for the expression of the heterologous gene in the strain of Gramineae to be transformed.

From the above quotations it should be clear that the motivation for placing a drought resistant trait, a grain trait or any of the other recited traits into maize would have been obvious to the person having ordinary skill in the art as these traits inherently comprise characteristics which the person having ordinary skill in the art knew were important to maize. In terms of the specific genes or gene elements, such as "a mannitol-1-phosphate dehydrogenase gene⁸" which is recited under claim 66 as "a drought resistance trait" Appellants have not argued nor provided evidence that this gene was not known in the prior art as a gene that promotes drought tolerance and in fact point in Appendix K to four prior art references⁹ that teach and suggest the isolation of this gene and its expression in tobacco in which the resultant plant demonstrates drought tolerance. Instead Appellant urge that "... none of these references teach or suggest the introduction of the specified genetic element into corn (no motivation), and none teach or suggest that the gene once introduced into corn would function to provide a benefit or solve a problem." It should be noted that in none of the pending claims is there a requirement that the transgenic plant either provide a benefit or solve a problem over the non-transgenic plant but merely that the plant exhibit "... one or more phenotypic characteristics that render it identifiable over the corresponding untransformed plant which does not comprise said gene." Where there is clearly motivation provided in the prior art for the insertion of the claimed genes and gene elements into maize there is just as clearly a reasonable expectation of success that each element would function to distinguish the claimed plant over a non-transformed maize plant by the claimed limitation. Merely insertion into the genome of maize or even expression at a level which did not provide drought tolerance, insect resistance, etc., would meet the limitations claimed.

⁷ Gramineae is a family of plants which include many different genera including corn (maize), rice wheat, barley, etc.

⁸ This limitation is not to a specific gene but to any gene encoding mannitol-1-phosphate dehydrogenase.

Appellants cite as controlling the decision *In re Deuel*, 34 USPQ2d 1211 (Fed.Cir. 1995) for the proposition that while the methodology for cloning a gene from a prior art protein was well known in the art the obtention of that gene was not made obvious by a possible process of making the claimed gene from the protein. The rejections of record, however, are not predicated on a method of making but on actual compositions in the prior art and suggestions in the prior art to place into maize genes and gene elements that would be beneficial to maize, that is, those having the claimed agronomic characteristics. The examiner in *Deuel* did not cite any art teaching DNA but relied on a method to obtain the claimed DNA from prior art elements. That is not the issue here. Transgenic maize plants were known in the prior art. The specific claimed DNA species were known and readily available in the prior art and were taught to be beneficial in the prior art. Motivation for their insertion into maize is found in the prior art and a reasonable expectation of success that the transgenic plants would be identifiable over non-transgenic plants is also found in the prior art. While Appellants frame the issue of identifying transgenic plants in terms of predictable function (page 13) the issue in fact is would a reasonable expectation of success be found that the **invention would function as claimed**. There is no requirement in the claims on appeal that the DNA function in a manner other than it allow the identification of the transgenic plant over the non-transgenic plant. As argued above, this insertion of the claimed DNA species into maize alone, even absent expression, would meet the claimed limitation since the phenotype of the plant or plant cell would have been modified and the phenotype of the new organism is readily determinable. Nothing more is required.

Finally, at pages 18 and 29 Appellants refer to a statement in the advisory action⁹ regarding a vague statement that the mere existence of a gene is not motivation to place it in a plant. If a gene has no known function in a plant, such as the antifreeze gene isolated from flounder, it would not be predictable that the plant which expressed the gene would be resistant to cold or merely have a fishy smell. Where there might be a reasonable expectation to try to insert such a gene into a plant the genes claimed in the instant application comprise gene species which have known beneficial agronomic effects. Clearly this is sufficient motivation for the production of a transgenic maize plant comprising the genes in order to acquire the known beneficial agronomic effect. Furthermore as the only claimed effect of these genes and gene elements is that they provide a means of identification over non-transformed plants, in view of the

⁹ It would appear that the reference at page 18 to lines 74-75 should have been to lines 86-89.

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state of the art as evidenced by both Goldman et al. and Lundquist et al., the person having ordinary skill in the art would find a reasonable expectation of success in achieving the claimed invention.

Conclusion

In view of the rejection and arguments set forth above it is submitted that the decision of the examiner is sound and should be affirmed.

Respectfully submitted.

GARY BENZION
PRIMARY EXAMINER
GROUP 1800


Gary Benzion

Period of response to new ground of rejection.

In view of the new ground of rejection, Appellant is given a period of TWO MONTHS from the mailing date of this examiner's answer within which to file a reply to any new ground of rejection. Such reply may include any amendment or material appropriate to the new ground of rejection. Prosecution otherwise remains closed. Failure to respond to the new ground of rejection will result in dismissal of the appeal of the claims so rejected. Note that this time period is not subject to the provisions of 37 CFR 1.136(a).